

Information geometry and the hydrodynamical formulation of quantum mechanics

Mathieu Molitor

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Let (M, g) be a compact, connected and oriented Riemannian manifold. We denote D the space of smooth probability density functions on M .

In this paper, we show that the Frechet manifold D is equipped with a Riemannian metric $g^{\{D\}}$ and an affine connection $\nabla^{\{D\}}$ which are infinite dimensional analogues of the Fisher metric and exponential connection in the context of information geometry. More precisely, we use Dombrowski's construction together with the couple $(g^{\{D\}}, \nabla^{\{D\}})$ to get a (non-integrable) almost Hermitian structure on D , and we show that the corresponding fundamental 2-form is a symplectic form from which it is possible to recover the usual Schrodinger equation for a quantum particle living in M .

These results echo a recent paper of the author where it is stressed that the Fisher metric and exponential connection are related (via Dombrowski's construction) to Kahler geometry and quantum mechanics in finite dimension.

Subjects: **Differential Geometry (math.DG)**

MSC classes: 81P99, 94A15, 62B10, 53B35, 58B10, 37K99

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